

## PROGRAM OVERVIEW

The PCS High School Tech-Ed solution emphasizes an incremental approach to teaching students Professional Technical Education topics that are heavily influenced by STEM (Science Technology Engineering and Mathematics) education strands. Beginning with simple projects, such as constructing a gear train, students expand their knowledge incrementally progressing through increasingly rigorous activities. The program culminates with a capstone project that is a solid introduction to real world professional development environments.



### **The Grade 10 scope and sequence (Systems and Cycles)**

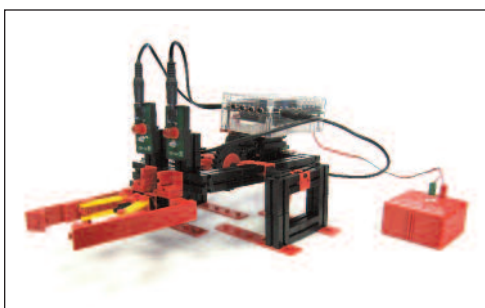
integrates projects with mechanisms, materials science, programming, careers, electronics, and engineering core technologies.

### **Grade 11 scope and sequence (Applications of Technology)**

integrates projects with digital video production, robotics, programming, careers, energy, and core engineering technologies.

### **The Grade 12 scope and sequence (Engineering Design)**

emphasizes mechanisms, CAD and design, advanced AVR Robotic programming, modeling, simulations, and the engineering design process.



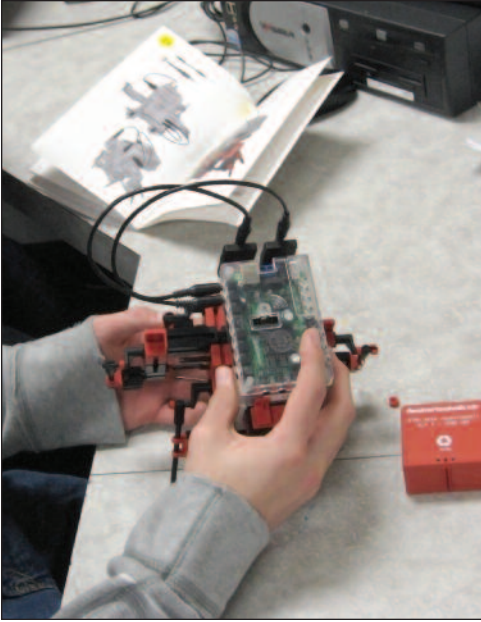
The PCS High School Tech-Ed solution is designed to develop an appreciation of technical fields and occupations while learning about skills essential to these systems.

The primary objectives of the PCS High School Tech-Ed Solution include:



- (1) Students will have a foundation and application of technology,
- (2) Students will have experience using the engineering design process,
- (3) Students will participate in a series of hands-on project based challenges.

# 10th Grade Tech-Ed Solution: Systems & Cycles

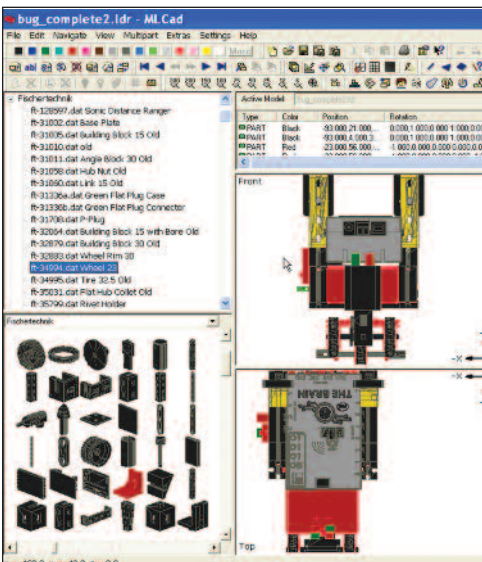


## 10TH GRADE

Systems and Cycles course is designed to introduce students to basic technological principles. These topics include: mechanisms, robotics, pneumatics, programming, materials science, modeling, programming, careers, analog and digital electronics, core concepts of technology, advanced mechanisms, and the engineering design process. Each quarter ends with a hands-on challenge that integrates the themes of the quarter.

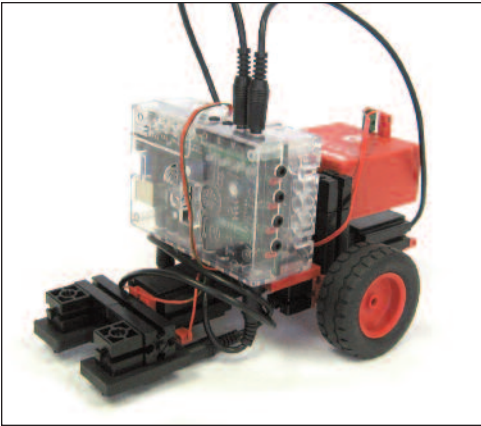
### Activities and Projects:

- Intro to Robotics
- Vehicles
- Robotic Arms
- End Effectors
- Mechanical Control of your Robot
- Gear Trains
- Belts
- Pneumatics
- Feedback
- Switches
- The Chassis
- Integration Projects
- Input & Output
- Differentials
- Materials Science Project
- Modeling
- CAD
- Applied Math using Robotics
- Portfolio Creation
- Engineering Careers
- Intro to Gear Trains
- Belt and Chain Reduction
- Gear Transmission Methods
- Torque & Horsepower
- Independent Study of Complex Gear Systems
- Design Process
- Simple C Programming
- Capstone Preparatory Challenges
- Final Capstone Project and Portfolio



Students will use the Academy of Robotics and Academy of Engineering with fischertechnik and the Digital Media Labs for these projects.

# 11th Grade Tech-Ed Solution: Applications of Technology

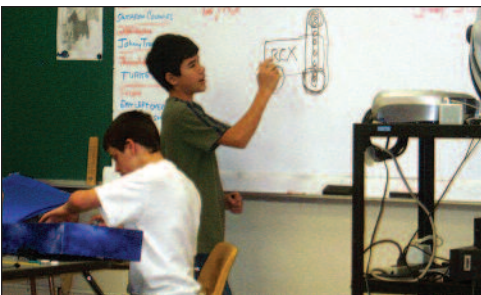
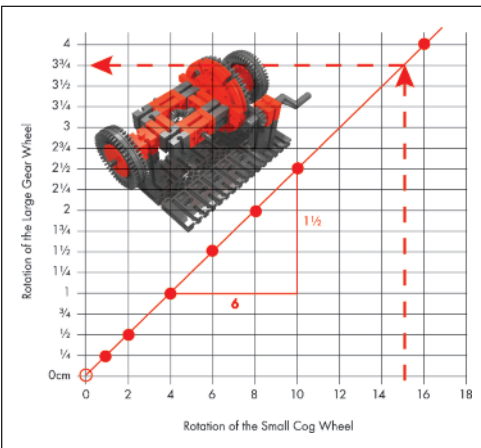


## 11TH GRADE

Applications of Technology advances the themes begun in Systems and Cycles. Topics include: digital video production, mechanisms, motor control, robotics, pneumatics, programming, careers, energy technologies, advanced mechanisms, the engineering design process, and a study of the consequences of technology. Each quarter ends with a hands-on challenge that integrates the themes of the quarter.

### Activities and Projects:

- Mechanisms
- Robotic Vehicles
- Mechanical Controls
- Pneumatic Controls
- Logic Gates
- Steering
- Sensors
- Feedback
- Advanced Robotics
- Applied Math using Robotics (Geometry)
- Simple C and Intro to C Programming
- Engineering Careers
- Introduction to Power Transfer Systems



Students will use the Academy of Robotics and Academy of Engineering with fischertechnik and the Digital Media Labs for these projects.



# 12th Grade Tech-Ed Solution: Applications of Technology



## 12TH GRADE

Engineering Design caps the themes begun in the previous courses. Topics include: advanced mechanisms, MPR programming, advanced CAD, careers, programming in AVR Studio, the engineer design process, and core engineering technologies. Each quarter ends with a hands-on challenge that integrates the themes of the quarter, and the final challenge is a capstone project that will ask students to apply their knowledge to an engineering project.

### Activities and Projects:

#### 1st and 2nd Quarter: The Science of Engineering:

- Engineering Careers
- Robotic Motor Control
- Design Constraints and Issues
- Sensor and Motor Interaction
- Advanced End Effectors
- Intro to C Programming
- Complex Robotic Systems
- C Programming
- Robotic Challenge

Students will use the Digital Media Labs, and the Academy of Robotics with fischertechnik for these projects.



### Activities and Projects:

#### 3rd and 4th Quarter: Sr. Project Capstone - Minds-i:

- Engineering Careers
- Engineering Design Process
- Overview of Senior Project
- Design Constraints and Issues
- Advanced Robotic Devices
- C Programming with MINDS-i
- Capstone Preparatory Challenges
- Robotic Capstone Project

Students will use the Digital Media Labs and the Minds-i Robotics Kits for these projects.

